PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference G69116/ER/so	**FOR FURTHER ACTION**	See Form PCT/IPEA/416
International application No. PCT/EP2004/001796	International filing date *(day/month/year)* 24.02.2004	Priority date *(day/month/year)* 04.03.2003
International Patent Classification (IPC) or national classification and IPC F16N29/02		
Applicant BAREA, Tiziano		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☐ *sent to the applicant and to the International Bureau)* a total of sheets, as follows:
      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
22.11.2004	31.01.2005
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Consalvo, D Telephone No. +49 89 2399-7093

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/EP2004/001796

10/547667

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1, 2, 4-11	as originally filed
3, 3a	received on 22.12.2004 with letter of 17.11.2004

Claims, Numbers

1-22	as originally filed

Drawings, Sheets

1/2-2/2	as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	2-15,17-22
	No:	Claims	1,16
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-22
Industrial applicability (IA)	Yes:	Claims	1-22
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item I
Basis of the report

This report is based on the originally filed claims.

Re Item V
Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: DE 43 41 466 A (GUMMLICH HARALD DIPL ING) 8 June 1995 (1995-06-08)
D2: PATENT ABSTRACTS OF JAPAN vol. 015, no. 032 (M-1073), 25 January 1991 (1991-01-25) & JP 02 271197 A (NIPPON SEIKO KK), 6 November 1990 (1990-11-06)
D3 : PATENT ABSTRACTS OF JAPAN vol. 012, no. 083 (M-677), 16 March 1988 (1988-03-16) & JP 62 223406 A (TOSHIBA CORP), 1 October 1987 (1987-10-01)
D4: DE 37 10 920 A (HYDRAULIK ZUBEHOER GES FUER) 20 October 1988 (1988-10-20).

1. Novelty

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT, for the following reasons:

2.1 Independent claim 1

D1 discloses, see col. 2, line 39-col. 4, line 67, and Fig. 1,

A device for monitoring the flow of a fluid flowing through or from a conduit (1), such as a lubricant, said fluid being a liquid, a gas or containing powder in suspension, said device comprising light emitting means (10) arranged to irradiate a light radiation towards said flow of fluid and sensor means (11) for said radiation, characterised in that the sensor

means are image sensors arranged to sense the image projected onto them by the fluid struck by said light radiation, said image sensor means generating at least one output signal (5) depending on the presence thereon of the sensed flow image, said signal representing in this manner characteristics of the fluid passing through the conduit or emerging from it such as its state of movement or rest, its flow rate or its direction in space.

Thus, D1 appears to be novelty destroying to the subject-matter of claim 1.

It might be argued that D1 discloses a photosensitive element and not an image sensor. However, a photosensitive element can be used as an image sensor when used in a scanning mode. Therefore said photosensor of D1 would be suitable for obtaining an "image of the fluid" or for reconstruct the position of the fluid in the space.

Moreover, it should be noted that the subject-matter of claim 5 in combination with the subject-matter of claim 1 discloses the feature that sensor means are a photosensitive element, which could well be a photodetector or a photodiode. This feature combined with the feature of claim 1, line 6, hints to the fact that also a photosensitive element is an image sensor.

It has to be noted that also documents D2 and D3 appear to be novelty destroying to the subject-matter of claim 1.

2.2 Independent claim 16

Step b) of method claim 16 is not explicitly disclosed in D1.
However, both documents D2/D3 disclose all the features of claim 16, therefore a lack of novelty arises also with respect to the subject-matter of independent method claim 16.

3. Inventive step

Dependent claims 2-15 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, see documents D1-D4 and the corresponding passages cited in the search report.
In particular, the subject-matter of claims 7 or 8 does not appear to meet the requirements of Article 56 EPC, for the following reasons. The technical difference with the closest prior art would be the use of a PSD or a CCD as a detector. In the field of optical inspection,

however, the use of a CCD camera or a PSD instead of a photodiode, see also page 5 lines 1-11, is common and the choice of one detector instead of another is made by the skilled person according to the requirements.

Moreover if the fluid passing through the conduit is not permeable to light (such as paint), the known device is unable to determine a correct flow rate of this fluid as the light source cannot be controlled in such a manner as to enable the receiver to receive a light signal.

The known solution does not enable measurement of a flow rate of fluid emitted (for example sprayed) by an atomizer or spray nozzle. Moreover, the known solution uses a simple optical sensor and does not enable fluid to be monitored through a conduit of large dimensions (such as those used for example to transport the water/oil emulsion for lubricating tools in numerically controlled automatic machines).

DE 43 41 466 describes a device for detecting very little amounts of clear liquid which moves in a transparent tube under the bearing force of air. The known solution, in particular, has a lighting device portion and a light converter cooperating with a photoelement; the lighting device portion outputs a light which is deflected by the liquid and which is detected by the light converter. The light is then directed to the photoelement which outputs signals which are then checked by an analysis unit. On the basis of a comparison with preset values, the analysis unit can ascertain whether the liquid contains impurities and whether a little amount of liquid is flowing into the tube.

The known device contains the transparent tube since the lighting device portion and the light converter are annular-shaped and the tube is located into their holes. Furthermore, said portion and converter are located on two different planes.

The known device uses a photoelement which, cooperating with the light converter, enables the detection of liquid to be obtained.

The other prior art cited in the Search Report, i.e. JP 02271197, JP 62223406, DE 3710920 as anticipating the present invention use a simple photodetector or photoelement and do not use an "image sensor" such as the present invention.

An object of the present invention is to provide a device able to monitor with absolute certainty the state of feed or flow interruption of a fluid fed to an operative zone or station from a relative tank or feed zone, such monitoring also being possible for a fluid which is not permeable to light.

Another object is to provide a device of the stated type which in no way influences the flow being monitored and which enable the state of the fluid and/or its flow rate to be directly determined, without this determination being subject to time variables related to adjustments within the device or in the operative modalities thereof.

Another object is to provide a device of the stated type which is of very small dimensions, such that the device can be easily applied in a place or on a machine in which a fluid of the stated type is used.

A further object is to provide a device of the stated type which is completely programmable to enable it to be easily adapted to the most disparate applications.

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